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VOLUME TABLES AND EQUATIONS FOR YOUNG-GROWTH
WESTERN HEMLOCK AND SITKA SPRUCE
IN SOUTHEAST ALASKA

by

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INTRODUCTION

The equations and tables presented here provide a means to estimate total cubic-foot and board-foot volume for western hemlock and Sitka spruce young-growth timber in southeast Alaska. Given field measurements of diameter outside bark at breast height ^{3/} (D) and total height in feet (H_T) or merchantable height in 16.3-foot logs (H_L), these equations and tables will yield data suitable for use in growth and yield studies, timber sales, management plans, and forestry inventories.

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^{3/} Abbreviations will be used hereafter to refer to the following measures or points of measure frequently referred to in the text and tables:

D.b.h. - diameter breast height

D.i.b. - diameter inside bark

D.o.b. - diameter outside bark.

Cubic-foot volumes can be estimated for:

- V_T - the entire stem including stump and top
- V_1 - the stem between a 1-foot stump and 4-inch top d.i.b.
- V_2 - the stem between a 1-foot stump and 6-inch top d.i.b.
- V_3 - the stem between a 1-foot stump and 8-inch top d.i.b.

International 1/4-inch board-foot volume can be estimated for:

- V_4 - the stem between a 1-foot stump and a merchantable ST (saw-timber) top taken as 40 percent of d.b.h. (outside bark) but not less than 6.0 inches d.i.b. Total height in feet.
- V_5 - the stem between a 1-foot stump and a merchantable ST top. Merchantable height in 16.3-foot logs.

Scribner board-foot volumes can be estimated for:

- V_6 - the stem between a 1-foot stump and a merchantable ST top. Total height in feet.
- V_7 - the stem between a 1-foot stump and a merchantable ST top. Merchantable height in 16.3-foot logs.

The basic data used in constructing these equations and tables were obtained from 527 trees (284 spruce and 243 hemlock) felled and measured in the late 1920's and early 1930's. All trees were from well-stocked young-growth stands located throughout southeast Alaska. Ages ranged from 40 to 150 years. The average form class for both species was 84.^{4/}

METHODS

The tree measurement data were compiled and volumes computed as outlined by Haack.^{5/} Predictor equations for each volume class (V_T , V_1 , V_2 , V_3 , V_4 , V_5 , V_6 , V_7 , and V_8) of a species were determined by regression analysis.^{6/} Variables were tested at the 95 percent F level for the basic equation:

$$V_i = b_0 + b_1 D + b_2 D^2 + b_3 H + b_4 D^2 H + b_5 1/D^2$$

^{4/} Form class = $\frac{\text{DIB @ top of first 16.3' log}}{\text{DOB @ BH or DOB above swell}}$

^{5/} Haack, P. M. Compilation of tree measurement data by hand or computer, Northern Forest Expt. Sta., 17 pp. March 1964.

^{6/} Boles, J. N. 40-series--stepwise regression system. Calif. Agr. Expt. Sta., Dept. of Agr. Econ., U. of Calif., Berkeley, 43 pp. dittoed. June 1962.

Standard deviation of residuals is commonly proportional to volume for such data. Hence, standard deviation would increase with increasing values of D and H and, in effect, the upper end of the regression curves at high values of V_1 would strongly affect positioning of the lower end of the curves at low values of V_1 . Thus, lower V_1 values predicted by equation might not fit the basic data. To equalize variance and improve the fit, weighting was applied. Since volume is strongly related to D^2H , weighting the regression by $(D^2H)^{-2}$ should effectively equalize variance. However, because of expected merging, unweighted regressions were also fitted to the data. Merging might occur, for example, with certain combinations of D and H, causing predictor values for volume class V_3 to appear greater than corresponding V_2 values. Variation in the data and sample-size distribution would account for this.

The efficiency of weighted vs. unweighted equations can be determined in the manner suggested by Furnival.^{7/} The two forms of the equation fitted were:

$$\text{Unweighted: } V_1 = b_0 + b_1D + b_2D^2 + b_3H + b_4D^2H + b_51/D^2$$

$$\text{Weighted: } \frac{V_1}{D^2H} = \frac{b'_0}{D^2H} + \frac{b'_1}{DH} + \frac{b'_2}{H} + \frac{b'_3}{D^2} + b'_4 + \frac{b'_5}{D^4H}$$

To express the weighted form of the regression in terms of V_1 , each term was multiplied by D^2H . The standard error of estimate or root mean square of residuals ($SE_{y.x}$) of the weighted form was de-transformed as follows:

$$SE_{y.x} \text{ in units of } V_1 = SE_{y.x} \text{ wt'd.} \cdot \overline{\text{antilog}_{10} (\log_{10} D^2H)}.$$

$$\text{An approximation of this is } SE_{y.x} \text{ wt'd.} \cdot \overline{(D^2H)}.$$

For simplicity, we have been expressing the relative efficiency of weighted vs. unweighted equations as

$$\frac{SE_{y.x}}{\overline{\text{antilog}_{10} (\log_{10} D^2H)} \cdot SE_{y.x} \text{ wt'd.}}$$

In terms of variance, the relative efficiency is greater.

^{7/} Furnival, G. M. An index for comparing equations used in constructing volume tables. Forest Sci. 7: 337-341. 1961.

Unfortunately, the multiple coefficient of determination (R^2), an index to the amount of variation accounted for by regression, could not be retrieved when weighting was used (table 1). Much of the variation associated with D^2H is removed by the weighting technique before the actual regression is performed. Thus, the part of the variation removed as a result of weighting does not appear in R^2 .

Weighting was helpful in all of the 16 volume equations (table 1). Only the equations of the final stepwise results were used.

For the cubic-foot equations examined, the regression coefficient for D^2H , the power variable, rounded to 0.002.

The equations used, their precision, and the methods of coping with merging, if present, are given in footnote 1 of each volume table.

PRECAUTIONS IN APPLICATION

The user may need occasionally to extend volumes beyond the presented tabular limits of D and H . This can cause merging among volume classes. If it does, a correction based upon subjective interpretation is the recommended solution. The user should adjust equation-derived volumes in what he thinks to be the most logical manner. Such adjustments should rarely be necessary, however, for few trees are expected to occur beyond the range of the tables.

All basic data were from forest-grown trees; therefore, the equations and tables may not give accurate estimates of volume for open-grown trees. Volumes of the latter may vary considerably from forest-grown trees due, apparently, to differences in form. Volume estimates for open-grown trees should be obtained by double sampling for the range of diameters and heights encountered, then applying correction factors to the tabular volumes presented here.

Table 1.--Precision and efficiency data for the final weighted
volume equations by species and volume class

CUBIC FOOT			
Species	Volume class	SE _{y.x} (percent)	Efficiency, wt'd. <u>vs.</u> unwt'd. (as a ratio of standard errors)
Hemlock	V _T	6.30	1.92
	V ₁	7.23	1.76
	V ₂	8.66	1.60
	V ₃	10.40	1.41
Spruce	V _T	6.04	2.73
	V ₁	6.57	2.56
	V ₂	7.13	2.42
	V ₃	8.08	2.21
BOARD FOOT			
Hemlock	V ₄	11.19	1.66
	V ₅	8.46	1.53
	V ₆	11.48	1.66
	V ₇	9.34	1.55
Spruce	V ₄	10.23	1.98
	V ₅	6.92	1.88
	V ₆	10.51	2.04
	V ₇	7.35	2.03

Table 2.--Cubic-foot volumes inside bark (entire stem) for western hemlock, southeast Alaska^{1/}

D.b.h. D ^{2/} Inches	Total height, H _T (feet) ^{3/}																	Basis: trees meas- ured ^{4/} Number
	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	
4	1.0	2.0	3.0															--
5	1.6	2.8	3.9	5.1														1
6	2.3	3.7	5.0	6.4	7.8													--
7	3.1	4.7	6.4	8.0	9.7	11.3	13.0											6
8	4.0	6.0	7.9	9.9	11.9	13.8	15.8	17.7										22
9	5.1	7.4	9.7	12.0	14.3	16.6	18.9	21.2	23.6									26
10	6.2	8.9	11.6	14.3	17.0	19.7	22.5	25.2	27.9	30.6								28
11		10.7	13.8	16.9	20.1	23.2	26.3	29.5	32.6	35.7	38.9							17
12		12.6	16.2	19.8	23.4	27.0	30.6	34.2	37.8	41.4	45.0	48.7						30
13			18.7	22.9	27.0	31.1	35.2	39.4	43.5	47.6	51.7	55.9						18
14			21.5	26.2	30.9	35.6	40.2	44.9	49.6	54.3	59.0	63.6	68.3					10
15			24.5	29.8	35.1	40.3	45.6	50.9	56.2	61.5	66.7	72.0	77.3					18
16				33.6	39.5	45.5	51.4	57.3	63.2	69.1	75.0	81.0	86.9	92.8				20
17				37.7	44.3	50.9	57.5	64.1	70.7	77.3	83.9	90.5	97.1	104				8
18				42.0	49.3	56.7	64.0	71.3	78.6	85.9	93.2	101	108	115				15
19						62.8	70.8	78.9	87.0	95.1	103	112	119	127				8
20							78.1	87.0	95.8	105	114	122	131	140				6
21							85.7	95.4	105	115	125	134	144	154				4
22							93.6	104	115	126	136	147	157	168				1
23							102	114	125	137	148	160	171	183				--
24							111	123	136	148	161	173	186	198				1
25							120	133	147	160	174	187	201	214	228			3
26								144	158	173	188	202	217	231	246			1
27								155	170	186	202	217	233	249	264			--
28									183	200	216	233	250	267	284			--
29									196	214	232	250	268	286	304			--
30											248	267	286	305	324	343	363	--
31											264	284	305	325	346	366	386	--
32											281	302	324	346	368	389	411	--
33											298	321	344	367	390	414	436	--
34											316	340	365	389	414	438	463	--
35											334	360	386	412	438	464	490	--

^{1/} Table volumes obtained from weighted regression equation: $V_T = -1.87017 + 0.06424H_T + 0.00206D^2H_T$. Standard error of estimate around mean volume = 2.74540 cu. ft. = $\pm 6.30\%$.

^{2/} Mid-point of class (e.g. 8 = 7.6 through 8.5 inches).

^{3/} Mid-point of class (e.g. 20 = 16 through 25 feet).

^{4/} Lines contain basic data for 243 measured trees used for computing regression equation.

Table 3.--Cubic-foot volumes inside bark (1-foot stump to 4 inch top d.i.b.) for western hemlock, southeast Alaska^{1/}

D.b.h. D ^{2/} Inches	Total height, H _T (feet) ^{3/}																	Basis: trees meas- ured ^{4/} Number
	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	
5	.6	1.7	2.8	4.0	5.1													1
6	1.2	2.6	3.9	5.3	6.7	8.0												--
7	2.0	3.6	5.3	6.9	8.5	10.1	11.7											6
8	2.9	4.8	6.8	8.7	10.6	12.6	14.5	16.4										22
9	4.0	6.2	8.5	10.8	13.0	15.3	17.6	19.8	22.1									26
10	5.1	7.8	10.4	13.1	15.7	18.4	21.0	23.7	26.3	29.0								28
11		9.5	12.5	15.6	18.7	21.8	24.8	27.9	31.0	34.1	37.1							17
12		11.3	14.9	18.4	21.9	25.5	29.0	32.6	36.1	39.6	43.2	46.7						30
13			17.5	21.4	25.5	29.5	33.6	37.6	41.7	45.7	49.8	53.8						18
14			20.1	24.7	29.3	33.9	38.5	43.1	47.7	52.3	56.8	61.4	66.0					10
15			23.0	28.2	33.4	38.6	43.7	48.9	54.1	59.3	64.5	69.6	74.8					18
16				32.0	37.8	43.6	49.4	55.2	61.0	66.8	72.6	78.4	84.2	90.0				20
17				36.0	42.4	48.9	55.4	61.9	68.3	74.8	81.3	87.7	94.2	101				8
18				40.2	47.4	54.6	61.7	68.9	76.1	83.3	90.5	97.6	105	112				15
19						60.5	68.5	76.4	84.3	92.2	100	108	116	124				8
20							75.6	84.3	93.0	102	110	119	128	137				6
21							83.0	92.6	102	112	121	131	140	150				4
22							90.8	101	112	122	132	143	153	164				1
23							99.0	110	122	133	144	156	167	178				--
24							108	120	132	144	157	169	181	193				1
25							116	130	143	156	170	183	196	209	222			3
26								140	154	169	183	197	212	226	240			1
27								151	166	181	197	212	228	243	258			--
28									178	195	211	228	244	261	277			--
29									191	209	226	244	262	279	297			--
30											242	260	279	298	317	336	355	--
31											258	278	298	318	338	358	378	--
32											274	296	317	338	360	381	402	--
33											291	314	337	359	382	404	427	--
34											309	333	357	381	405	429	453	--
35											327	352	378	403	429	454	479	--

^{1/} Table volumes obtained from weighted regression equation: $V_1 = -2.85632 + 0.06330H_T + 0.00202D^2H_T$. Standard error of estimate around mean volume = 3.01994 cu. ft. = $\pm 7.23\%$.

^{2/} Mid-point of class (e.g. 8 = 7.6 through 8.5 inches).

^{3/} Mid-point of class (e.g. 20 = 16 through 25 feet).

^{4/} Lines contain basic data for 243 measured trees used for computing regression equation.

Table 4.--Cubic-foot volumes inside bark (1-foot stump to 6-inch top d.i.b.) for western hemlock, southeast Alaska ^{1/}

D.b.h. D ^{2/}	Total height, H _T (feet) ^{3/}																	Basis: trees meas- ured ^{4/}
	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	
Inches																		Number
7	.3	1.6	2.9	4.3	5.6	6.9	8.3	9.6										6
8	1.2	2.9	4.5	6.2	7.8	9.5	11.1	12.8	14.4									22
9	2.3	4.3	6.4	8.4	10.4	12.4	14.4	16.4	18.4									26
10	3.5	6.0	8.4	10.8	13.2	15.6	18.0	20.5	22.9	25.3								28
11		7.7	10.6	13.5	16.3	19.2	22.1	24.9	27.8	30.7	33.5							17
12		9.7	13.1	16.4	19.8	23.1	26.5	29.8	33.2	36.5	39.9	43.2						30
13			15.7	19.6	23.5	27.4	31.3	35.1	39.0	42.9	46.8	50.7						18
14			18.6	23.1	27.5	32.0	36.4	40.9	45.4	49.8	54.3	58.7	63.2					10
15			21.7	26.8	31.8	36.9	42.0	47.1	52.2	57.2	62.3	67.4	72.5					18
16				30.7	36.5	42.2	47.9	53.7	59.4	65.2	70.9	76.6	82.4	88.1				20
17				34.9	41.4	47.8	54.3	60.7	67.2	73.6	80.0	86.0	92.9	99.4				8
18				39.4	46.6	53.8	61.0	68.2	75.4	82.5	89.7	96.9	104	111				15
19						60.1	68.1	76.0	84.0	92.0	100	108	116	124				8
20							75.6	84.3	93.0	102	110	119	128	137				6
21							83.0	92.6	102	112	121	131	140	150				4
22							90.8	101	112	122	132	143	153	164				1
23							99.0	110	122	133	144	156	167	178				--
24							108	120	132	144	157	169	181	193				1
25							116	130	143	156	170	183	196	209	222			3
26								140	154	169	183	197	212	226	240			1
27								151	166	181	197	212	228	243	258			--
28									178	195	211	228	244	261	277			--
29									191	209	226	244	262	279	297			--
30											242	260	279	298	317	336	355	--
31											258	278	298	318	338	358	378	--
32											274	296	317	338	360	381	402	--
33											291	314	337	359	382	404	427	--
34											309	333	357	381	405	429	453	--
35											327	352	378	403	429	454	479	--

^{1/} Table volumes outside block enclosed by broken line obtained from weighted regression equation:

$V_2 = -3.70342 + 0.02856H_T + 0.00213D^2H_T$. Standard error of estimate around mean volume = 3.43175 cu. ft. = $\pm 8.66\%$. Table volumes inside block enclosed by broken line obtained from weighted regression equation: $V_1 = -2.85632 + 0.06330H_T + 0.00202D^2H_T$.

^{2/} Mid-point of class (e.g. 8 = 7.6 through 8.5 inches).

^{3/} Mid-point of class (e.g. 20 = 16 through 25 feet).

^{4/} Lines contain basic data for 242 measured trees used for computing regression equation.

Table 5.--Cubic-foot volumes inside bark (1-foot stump to an 8-inch top d.i.b.) for western hemlock, southeast Alaska^{1/}

D.b.h. D ² / ₄	Total height, H _T (feet) ^{3/}																Basis: trees meas- ured ^{4/}
	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	
Inches																	Number
9		0.6	2.1	3.7	5.3	6.8	8.4	9.9	11.5								21
10	2.7	4.6	6.6	8.5	10.4	12.3	14.2	16.2	18.1								28
11	6.0	8.3	10.6	12.9	15.3	17.6	19.9	22.2	24.6	26.9							17
12	9.0	11.7	14.5	17.3	20.0	22.8	25.6	28.3	31.1	33.9	36.6						30
13		15.1	18.4	21.6	24.9	28.1	31.3	34.6	37.8	41.1	44.3						18
14		18.5	22.2	26.0	29.8	33.5	37.3	41.1	44.8	48.6	52.4	56.1					10
15		21.9	26.2	30.5	34.8	39.2	43.5	47.8	52.1	56.4	60.8	65.1					18
16			30.3	35.2	40.1	45.0	49.9	54.9	59.8	64.7	69.6	74.5	79.4				20
17			34.5	40.1	45.6	51.2	56.7	62.3	67.8	73.4	78.9	84.5	90.0				8
18			38.9	45.1	51.3	57.6	63.8	70.0	76.2	82.4	88.7	94.9	101				15
19					57.3	64.3	71.2	78.1	85.0	92.0	98.9	106	113				8
20						71.2	78.9	86.6	94.3	102	110	117	125				6
21						78.6	87.0	95.5	104	112	121	129	138				4
22						86.2	95.5	105	114	123	133	142	151				1
23						94.1	104	114	125	135	145	155	165				--
24						102	113	124	136	147	158	169	180				1
25						111	123	135	147	159	171	183	195	207			3
26							133	146	159	172	185	198	211	224			1
27							143	157	171	185	199	213	227	241			--
28								169	184	199	214	229	244	259			--
29								181	197	213	229	246	262	278			--
30										228	245	263	280	297	314	332	--
31										243	261	280	299	317	335	354	--
32										259	279	298	318	338	358	377	--
33										275	296	317	338	359	380	401	--
34										292	314	337	359	381	403	425	--
35										310	333	356	380	404	427	451	--

^{1/} Table volumes obtained from weighted regression equation: $V_3 = 4.49397 + 0.00192D^2H_T - \frac{946.29388}{D^2}$.

Standard error of estimate around mean volume = 4.22650 cu. ft. = $\pm 10.40\%$.

^{2/} Mid-point of class (e.g. 8 = 7.6 through 8.5 inches).

^{3/} Mid-point of class (e.g. 20 = 16 through 25 feet).

^{4/} Lines contain basic data for 209 measured trees used for computing regression equation.

Table 6.--Cubic-foot volumes inside bark (entire stem) for Sitka spruce, southeast Alaska ^{1/}

D.b.h. D ^{2/} Inches	Total height, H _T (feet) ^{3/}																	Basis: trees meas- ured ^{4/} Number
	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	
4	1.5	2.0	2.5															1
5	2.1	2.8	3.6	4.3														--
6	2.9	3.8	4.8	5.7	6.7	7.7	8.6											1
7	3.7	5.0	6.2	7.5	8.7	10.0	11.2	12.5										9
8	4.8	6.3	7.9	9.5	11.1	12.7	14.3	15.8	17.4									14
9	5.9	7.9	9.8	11.8	13.8	15.7	17.7	19.6	21.6	23.6								19
10	7.2	9.6	12.0	14.3	16.7	19.1	21.5	23.9	26.3	28.7								23
11	8.6	11.4	14.3	17.2	20.0	22.9	25.7	28.6	31.5	34.3	37.2	40.0						25
12			16.9	20.3	23.6	27.0	30.4	33.8	37.1	40.5	43.9	47.3						16
13			19.7	23.6	27.5	31.5	35.4	39.4	43.3	47.2	51.2	55.1						23
14			22.7	27.2	31.8	36.3	40.9	45.4	49.9	54.5	59.0	63.6	68.1					16
15			26.0	31.1	36.3	41.5	46.7	51.9	57.1	62.3	67.5	72.7	77.9					19
16			29.4	35.3	41.2	47.1	53.0	58.8	64.7	70.6	76.5	82.4	88.3					17
17			33.1	39.7	46.4	53.0	59.6	66.2	72.9	79.5	86.1	92.7	99.4					14
18			37.0	44.4	51.9	59.3	66.7	74.1	81.5	88.9	96.3	104	111	118	126			18
19						65.9	74.1	82.4	90.6	98.8	107	115	124	132	140			11
20						72.9	82.0	91.1	100	109	118	128	137	146	155			3
21						80.2	90.3	100	110	120	130	140	150	160	170	180		12
22						87.9	98.9	110	121	132	143	154	165	176	187	198		6
23						96.0	108	120	132	144	156	168	180	192	204	216		9
24						104	118	130	144	157	170	183	196	209	222	235		6
25						113	127	142	156	170	184	198	212	226	241	255		5
26							153	168	184	199	214	229	245	260	275			2
27							165	181	198	214	231	247	264	280	297			4
28								212	230	248	266	283	301	319				3
29								228	247	266	285	304	323	342				1
30								244	264	284	305	325	345	366	386			4
31										304	325	347	368	390	412			1
32										323	346	369	392	416	439			--
33										344	368	393	417	442	466			--
34										365	391	417	443	469	495			1
35										386	414	441	469	497	524			--

^{1/} Table volumes obtained from weighted regression equation: $V_T = 0.01500H_T + 0.00224D^2H_T$. Standard error of estimate around mean volume = 4.20266 cu. ft. = $\pm 6.04\%$.

^{2/} Mid-point of class (e.g. 8 = 7.6 through 8.5 inches).

^{3/} Mid-point of class (e.g. 20 = 16 through 25 feet).

^{4/} Lines contain basic data for 284 measured trees used for computing regression equation. One tree not shown in the "Basis" column was in the 38-inch diameter class.

Table 7.--Cubic-foot volumes inside bark (1-foot stump to 4-inch top d.i.b.) for Sitka spruce, southeast Alaska^{1/}

D.b.h. D ² / Inches	Total height, H _T (feet) ^{3/}																	Basis: trees meas- ured ^{4/}
	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	
5	1.4	1.9	2.5	3.0														--
6	2.2	3.0	3.8	4.5	5.3	6.1	6.9											1
7	3.1	4.2	5.2	6.3	7.4	8.5	9.6	10.6										9
8	4.1	5.5	6.9	8.3	9.7	11.1	12.6	14.0	15.4									14
9	5.3	7.0	8.8	10.6	12.4	14.2	15.9	17.7	19.5	21.3								19
10	6.5	8.7	10.9	13.1	15.3	17.5	19.7	21.9	24.1	26.3								23
11	7.9	10.6	13.2	15.9	18.6	21.2	23.9	26.6	29.2	31.9	34.5	37.2						25
12			15.8	19.0	22.1	25.3	28.5	31.6	34.8	38.0	41.1	44.3						16
13			18.5	22.3	26.0	29.7	33.4	37.1	40.9	44.6	48.3	52.0						23
14			21.5	25.8	30.1	34.5	38.8	43.1	47.4	51.7	56.0	60.3	64.6					16
15			24.7	29.7	34.6	39.6	44.5	49.5	54.4	59.4	64.3	69.3	74.2					19
16			28.1	33.8	39.4	45.0	50.7	56.3	61.9	67.6	73.2	78.8	84.5					17
17			31.8	38.1	44.5	50.8	57.2	63.6	69.9	76.3	82.6	89.0	95.3					14
18			35.6	42.7	49.9	57.0	64.1	71.3	78.4	85.5	92.6	99.8	107	114	121			18
19						63.5	71.5	79.4	87.3	95.3	103	111	119	127	135			11
20						70.4	79.2	88.0	96.8	106	114	123	132	141	150			3
21						77.6	87.3	97.0	107	116	126	136	146	155	165	175		12
22						85.2	95.8	106	117	128	138	149	160	170	181	192		6
23						93.1	105	116	128	140	151	163	175	186	198	210		9
24						101	114	127	139	152	165	174	190	203	215	228		6
25						110	124	138	151	165	179	192	206	220	234	248		5
26							149	164	179	193	208	223	238	253	268			2
27							160	176	192	208	224	241	257	273	289			4
28									207	224	242	259	276	293	310			3
29									222	240	259	278	296	314	333			1
30									238	257	277	297	317	337	356	376		4
31											296	317	338	359	380	402		1
32											315	338	360	383	406	428	--	
33											335	359	383	407	431	455	--	
34											356	382	407	432	458	483	1	
35											377	404	431	458	485	512	--	

^{1/} Table volumes obtained from weighted regression equation: $V_1 = 0.00220D^2H_T - \frac{7.32683}{D^2}$
 Standard error of estimate around mean volume = 4.39369 cu. ft. = $\pm 6.57\%$.

^{2/} Mid-point of class (e.g. 8 = 7.6 through 8.5 inches).

^{3/} Mid-point of class (e.g. 20 = 16 through 25 feet).

^{4/} Lines contain basic data for 283 measured trees used for computing regression equation. One tree not shown in the "Basis"

column was in the 38-inch diameter class.

Table 8.--Cubic-foot volumes inside bark (1-foot stump to 6-inch top d.i.b.) for Sitka spruce, southeast Alaska^{1/}

D.b.h. D ^{2/} Inches	Total height, H _T (feet) ^{3/}																	Basis: trees meas- ured ^{4/} Number
	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	
7		1.1	2.1	3.2	4.3	5.3	6.4	7.4										9
8	1.7	3.1	4.5	5.9	7.3	8.7	10.0	11.4	12.8									14
9	3.3	5.1	6.8	8.6	10.3	12.1	13.8	15.6	17.3	19.1								19
10	4.9	7.1	9.3	11.4	13.6	15.7	17.9	20.1	22.2	24.4	26.5							23
11	6.6	9.2	11.8	14.4	17.0	19.6	22.2	24.9	27.5	30.1	32.7	35.3						25
12			14.5	17.6	20.7	23.8	26.9	30.0	33.1	36.3	39.4	42.5						16
13			17.3	21.0	24.6	28.3	31.9	35.6	39.2	42.9	46.5	50.2						23
14			20.4	24.6	28.8	33.1	37.3	41.5	45.8	50.0	54.3	58.5	62.7					16
15			23.6	28.5	33.3	38.2	43.1	47.9	52.8	57.6	62.5	67.4	72.2					19
16			27.0	32.6	38.1	43.6	49.2	54.7	60.2	65.8	71.3	76.8	82.3					17
17			30.7	36.9	43.2	49.4	55.6	61.9	68.1	74.4	80.6	86.9	93.1					14
18			34.5	41.5	48.5	55.5	62.5	69.5	76.5	83.5	90.5	97.5	104	112	118			18
19						62.0	69.8	77.5	85.3	93.1	101	109	116	124	132			11
20						68.7	77.4	86.0	94.7	103	112	121	129	138	146			3
21						75.9	85.4	94.9	104	114	124	133	142	152	162	171		12
22						83.3	93.8	104	115	125	136	146	156	167	177	188		6
23						91.1	102	114	125	137	148	160	171	182	194	205		9
24						99.3	112	124	136	149	162	174	186	199	211	224		6
25						108	121	135	148	162	175	189	202	216	229	243		5
26							146	160	175	190	204	219	233	248	263			2
27							157	173	189	204	220	236	252	268	283			4
28									203	220	237	254	271	288	305			3
29									218	236	254	272	290	309	327			1
30									233	252	272	291	311	330	350	369		4
31											290	311	332	353	374	394		1
32											310	332	354	376	398	420	--	
33											329	353	376	400	423	447	--	
34											349	374	399	424	449	474	1	
35											370	397	423	450	476	503	--	

^{1/} Table volumes obtained from weighted regression equation: $V_2 = 0.00216D^2H_T - \frac{154.15834}{D^2}$. Standard error of estimate around mean volume = 4.68240 cu. ft. = $\pm 7.13\%$.

^{2/} Mid-point of class (e.g. 8 = 7.6 through 8.5 inches).

^{3/} Mid-point of class (e.g. 20 = 16 through 25 feet).

^{4/} Lines contain basic data for 282 measured trees used for computing regression equation. One tree not shown in the "Basis" column was in the 38-inch diameter class.

Table 9.--Cubic-foot volumes inside bark (1-foot stump to 8-inch top d.i.b.) for Sitka spruce, southeast Alaska^{1/}

D.b.h. D ^{2/}	Total height, H _T (feet) ^{3/}																	Basis: trees meas- ured ^{4/}
	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	
Inches																		Number
9	1.9	2.2	2.6	3.0	3.3	3.7	4.0	4.4	4.7	5.1								19
10	4.5	5.5	6.5	7.4	8.4	9.4	10.3	11.3	12.3	13.3								23
11	6.7	8.4	10.0	11.7	13.3	15.0	16.6	18.2	19.9	21.5	23.2	24.8						25
12			13.2	15.6	18.0	20.4	22.8	25.1	27.5	29.9	32.3	34.7						16
13			16.1	19.3	22.5	25.7	28.8	32.0	35.2	38.4	41.6	44.8						23
14			18.6	22.7	26.7	30.8	34.9	38.9	43.0	47.0	51.1	55.1	59.2					16
15			20.8	25.8	30.8	35.8	40.8	45.8	50.8	55.8	60.7	65.7	70.7					19
16			22.7	28.6	34.6	40.6	46.6	52.6	58.6	64.6	70.6	76.6	82.3					17
17			24.2	31.2	38.3	45.3	52.4	59.4	66.5	73.5	80.6	86.9	93.1					14
18			25.3	33.5	41.7	49.9	58.1	66.2	74.4	82.6	90.5	97.5	104	112	118			18
19						54.3	63.7	73.0	82.4	91.8	101	109	116	124	132			11
20						58.6	69.2	79.8	90.4	101	112	121	129	138	146			3
21						62.7	74.6	86.6	98.5	110	122	133	142	152	162	171		12
22						66.7	80.0	93.3	107	120	133	146	156	167	177	188		6
23						70.5	85.3	100	115	130	144	159	171	182	194	205		9
24						74.2	90.5	107	123	139	156	172	186	199	211	224		6
25						77.7	95.6	114	131	149	167	185	202	216	229	243		5
26								120	140	159	179	198	218	233	248	263		2
27								127	148	169	190	212	233	252	268	283		4
28										180	202	225	248	271	288	305		3
29										190	215	239	264	289	309	327		1
30										200	227	254	280	307	330	350	369	4
31												268	297	326	353	374	394	1
32												283	314	344	375	398	420	--
33												298	331	363	396	423	447	--
34												313	348	383	418	449	474	1
35												328	366	403	440	476	503	--

^{1/} Table volumes outside block enclosed by broken line obtained from weighted regression equation:

$$V_3 = -36.25457 + 7.08915D - 0.32996D^2 - 0.22524H_T + 0.00322D^2H_T. \text{ Standard error of estimate around mean volume} = 5.42952 \text{ cu. ft.}$$

$$= \pm 8.08\%. \text{ Table volumes inside block enclosed by broken line obtained from weighted regression equation: } V_2 = 0.00216D^2H_T - \frac{154.15834}{D^2}.$$

^{2/} Mid-point of class (e.g. 8 = 7.6 through 8.5 inches).^{3/} Mid-point of class (e.g. 20 = 16 through 25 feet).^{4/} Lines contain basic data for 259 measured trees used for computing regression equation. One tree not shown in the "Basis" column was in the 38-inch diameter class.

14 Table 10.--International 1/4-inch board-foot volumes (1-foot stump to merchantable ST top) for western hemlock, southeast Alaska^{1/}

D.b.h. D ^{2/}	Total height, H _T (feet) ^{3/}																Basis: trees meas- ured ^{4/}
	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	
Inches																	Number
11	20.2	44.5	68.8	93.0	117	142	166	190	214	239							17
12	21.6	49.9	78.2	106	135	163	191	220	248	276	304						30
13		55.8	88.4	121	154	186	219	252	284	317	350	382					18
14		62.1	99.5	137	174	212	249	286	324	361	398	436					10
15		69.0	111	154	196	238	281	323	366	408	450	493					18
16			124	172	220	267	315	363	411	458	506	554	602				20
17			138	191	245	298	352	405	459	512	566	619	673				8
18			152	212	271	331	390	450	510	569	629	688	748				15
19					299	365	431	497	563	629	696	762	828				8
20						402	474	547	620	693	766	839	911				6
21						440	520	600	680	760	840	920	1000				4
22						480	567	655	742	830	917	1005	1092				1
23						522	617	712	808	903	998	1094	1189				--
24						566	669	772	876	979	1083	1186	1290				1
25						611	723	835	947	1059	1171	1283	1395	1507			3
26							780	900	1021	1142	1263	1384	1505	1626			1
27							838	968	1098	1228	1359	1489	1619	1749			--
28								1039	1178	1318	1458	1597	1737	1877			--
29								1112	1261	1411	1560	1710	1860	2009			--
30										1507	1667	1827	1987	2146	2306	2466	--
31										1606	1777	1947	2118	2288	2459	2629	--
32										1709	1890	2072	2253	2435	2616	2798	--
33										1815	2007	2200	2393	2586	2779	2971	--
34										1924	2128	2333	2537	2742	2946	3150	--
35										2036	2252	2469	2685	2902	3118	3335	--

1/ Table volumes obtained from weighted regression equation: $V_4 = -0.63535D^2 + 0.32091H_T + 0.01741D^2H_T$. Standard error of estimate around mean volume = 37.55980 bd. ft. = 11.19%.

2/ Mid-point of class (e.g. 12 = 11.6 through 12.5 inches).

3/ Mid-point of class (e.g. 80 = 76 through 85 feet).

4/ Lines contain basic data for 160 measured trees used for computing regression equation.

Table 11.--International 1/4-inch board-foot volumes (1-foot stump to merchantable ST top) for western hemlock, southeast Alaska^{1/}

D.b.h. D ₂ / Inches	Height, H _L (logs) ^{3/}										Basis: trees meas- ured ^{4/} Number
	1	2	3	4	5	6	7	8	9	10	
11	29.6	70.9	112	154	195	236					17
12	29.6	78.8	128	177	226	275	324				30
13	30.4	88.1	146	204	261	319	377				18
14	31.9	98.8	166	233	300	366	433	500			10
15	33.9	111	188	264	341	418	495	572			18
16	36.3	124	211	298	386	473	561	648			20
17	39.2	138	236	335	434	532	631	730			8
18	42.4	153	264	374	484	595	706	816			15
19		169	292	416	539	662	785	908			8
20		186	323	459	596	732	869	1005			6
21		204	355	506	656	807	957	1108			4
22		224	389	554	719	884	1050	1215			1
23		243	424	605	785	966	1146	1327			--
24		265	461	658	855	1051	1248	1444			1
25		287	500	713	927	1140	1353	1567			3
26			540	771	1002	1233	1463	1694	1925		1
27			582	831	1080	1329	1578	1826	2075		--
28			626	893	1161	1429	1696	1964	2231		--
29			671	958	1245	1532	1819	2106	2393		--
30				1025	1332	1639	1946	2254	2561	2868	--
31				1094	1422	1750	2078	2406	2734	3062	--
32				1166	1515	1865	2214	2563	2913	3263	--
33				1239	1611	1983	2354	2726	3098	3470	--
34				1315	1710	2105	2499	2894	3288	3683	--
35				1394	1812	2230	2648	3066	3484	3902	--

^{1/} Table volumes obtained from weighted regression equation:

$$V_5 = -0.22888D^2 + 0.34133D^2H_L + \frac{1933.45350}{D^2} \quad \text{Standard error of estimate around mean volume} \\ = 28.41275 \text{ bd. ft.} = 8.46\%.$$

^{2/} Mid-point of class (e.g. 12 = 11.6 through 12.5 inches).

^{3/} Mid-point of class (e.g. 3 = 2.6 through 3.5 logs).

^{4/} Lines contain basic data for 160 measured trees used for computing regression equation.

Table 12.--Scribner board-foot volumes (1-foot stump to merchantable ST top) for western hemlock, southeast Alaska^{1/}

D.b.h. D ^{2/} Inches	Total height, H _T (feet) ^{3/}																Basis: trees meas- ured ^{4/} Number
	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	
11	12.9	32.4	52.0	71.5	91.0	111	130	150	169	189							17
12	15.4	38.6	61.9	85.1	108	132	155	178	201	224	248						30
13		45.3	72.6	99.9	127	154	182	209	236	263	291	318					18
14		52.6	84.2	116	148	179	211	242	274	306	337	369					10
15		60.3	96.6	133	169	206	242	278	314	351	387	424					18
16			110	151	193	234	275	317	358	399	440	482	523				20
17			124	171	217	264	311	357	404	451	497	544	591				8
18			139	192	244	296	348	401	453	505	558	610	662				15
19					272	330	388	446	505	563	621	679	738				8
20						366	430	495	559	624	688	753	817				6
21						403	474	545	616	688	759	830	901				4
22						442	520	598	677	755	833	911	989				1
23						483	569	654	740	825	910	996	1081				--
24						526	619	712	805	898	991	1084	1177				1
25						571	672	773	874	975	1076	1176	1277	1378			3
26							727	836	945	1054	1163	1272	1381	1490			1
27							784	901	1019	1137	1254	1372	1490	1607			--
28								969	1096	1222	1349	1476	1602	1729			--
29								1040	1176	1311	1447	1583	1719	1854			--
30										1403	1549	1694	1839	1984	2130	2275	--
31										1499	1654	1809	1964	2119	2274	2429	--
32										1597	1762	1927	2093	2258	2423	2588	--
33										1698	1874	2050	2225	2401	2577	2753	--
34										1803	1989	2176	2362	2549	2736	2922	--
35										1910	2108	2306	2503	2701	2899	3096	--

^{1/} Table volumes obtained from weighted regression equation: $V_6 = -0.53887D^2 + 0.01614D^2H_T$. Standard error of estimate around mean volume = 33.58288 bd. ft. = 11.48%.

^{2/} Mid-point of class (e.g. 12 = 11.6 through 12.5 inches).

^{3/} Mid-point of class (e.g. 80 = 76 through 85 feet).

^{4/} Lines contain basic data for 160 measured trees used for computing regression equation.

Table 13.--Scribner board-foot volume (1-foot stump to merchantable ST top) for western hemlock, southeast Alaska ^{1/}

D.b.h. D ^{2/}	Height, H _L (logs) ^{3/}										Basis: trees meas- ured ^{4/}
	1	2	3	4	5	6	7	8	9	10	
Inches											Number
11	15.9	51.6	87.4	123	159	194					17
12	19.0	61.5	104	146	189	232	274				30
13	22.2	72.1	122	172	222	272	322				18
14	25.8	83.6	142	199	257	315	373	431			10
15	29.6	96.0	162	229	295	362	428	494			18
16	33.7	109	185	260	336	412	487	563			20
17	38.0	123	209	294	379	464	550	635			8
18	42.7	138	234	330	425	521	616	712			15
19		154	261	367	474	580	687	793			8
20		171	289	407	525	643	761	879			6
21		188	318	449	579	709	839	969			4
22		207	349	492	635	778	921	1064			1
23		226	382	538	694	850	1006	1162			--
24		246	416	586	756	926	1096	1266			1
25		267	451	636	820	1005	1189	1374			3
26			488	688	887	1087	1286	1486	1685		1
27			526	741	957	1172	1387	1602	1817		--
28			566	797	1029	1260	1492	1723	1954		--
29			607	855	1104	1352	1600	1848	2096		--
30				915	1181	1447	1712	1978	2244	2509	--
31				977	1261	1545	1828	2112	2396	2679	--
32				1042	1344	1646	1948	2250	2553	2854	--
33				1108	1429	1750	2072	2393	2715	3036	--
34				1176	1517	1858	2199	2540	2882	3223	--
35				1246	1607	1969	2330	2692	3054	3415	--

^{1/} Table volumes obtained from weighted regression equation: $V_7 = -0.16350D^2 + 0.29514D^2H_L$.
Standard error of estimate around mean volume = 27.32668 bd. ft. = 9.34%.

^{2/} Mid-point of class (e.g. 12 = 11.6 through 12.5 inches).

^{3/} Mid-point of class (e.g. 3 = 2.6 through 3.5 logs).

^{4/} Lines contain basic data for 160 measured trees used for computing regression equation.

Table 14.--International 1/4-inch board-foot volumes (1-foot stump to merchantable ST top) for Sitka spruce, southeast Alaska^{1/}

D.b.h. D ^{2/} Inches	Total height, H _T (feet) ^{3/}																Basis: trees meas- ured ^{4/} Number
	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	
11	30.9	51.9	72.9	93.8	115	136	157	178	199	220	241						25
12		61.8	86.7	112	137	162	186	212	236	261	286						16
13		72.5	102	131	160	190	220	248	278	307	336						23
14		84.1	118	152	186	220	254	288	322	356	390						16
15		96.5	136	174	214	252	292	330	369	408	447	486					19
16		110	154	198	243	287	332	376	420	465	509	553					17
17		124	174	224	274	324	374	424	474	525	575	625					14
18		139	195	251	307	364	420	476	532	588	644	700					18
19					342	405	468	530	593	655	718	780	843	906			11
20					380	449	518	588	657	726	795	865	934	1003			3
21					418	495	571	648	724	800	877	953	1030	1106			12
22					459	543	627	711	795	879	962	1046	1130	1214	1298		6
23					502	594	685	777	869	960	1052	1144	1235	1327	1419		9
24					546	646	746	846	946	1046	1145	1245	1345	1445	1545		6
25					593	701	810	918	1026	1135	1243	1351	1460	1568	1676		5
26							876	993	1110	1227	1344	1461	1579	1696	1813		2
27							944	1071	1197	1323	1450	1576	1702	1828	1955		4
28									1287	1423	1559	1695	1831	1967	2102		3
29									1381	1527	1672	1818	1964	2110	2255		1
30									1478	1634	1790	1946	2102	2258	2414	2570	4
31											1911	2078	2244	2411	2577	2744	1
32											2036	2214	2391	2569	2746	2924	--
33											2165	2354	2543	2732	2920	3109	--
34											2299	2499	2700	2900	3100	3300	1
35											2436	2648	2861	3073	3285	3498	--

^{1/} Table volumes obtained from weighted regression equation: $V_4 = -0.43761D^2 + 0.01733D^2H_T$. Standard error of estimate around mean volume = 53.51232 bd.ft. = 10.23%.

^{2/} Mid-point of class (e.g. 12 = 11.6 through 12.5 inches).

^{3/} Mid-point of class (e.g. 80 = 76 through 85 feet).

^{4/} Lines contain basic data for 217 measured trees used for computing regression equation. One tree not shown in the "Basis" column was in the 38-inch diameter class.

Table 15.--International 1/4-inch board-foot volumes (1-foot stump to merchantable ST top) for Sitka spruce,
southeast Alaska ^{1/}

D.b.h. D ^{2/}	Height, H _L (logs) ^{3/}										Basis: trees meas- ured ^{4/}
	1	2	3	4	5	6	7	8	9	10	
<u>Inches</u>											<u>Number</u>
11	29.6	69.5	109	149	189	229	269				25
12	26.7	75.4	124	173	221	270	319				16
13	24.9	83.1	141	200	258	316	374				23
14	23.9	92.5	161	230	298	367	435	504			16
15	23.6	103	183	263	342	422	502	581			19
16	23.8	115	207	298	390	481	573	664			17
17	24.5	129	233	337	441	545	649	754			14
18	25.5	143	261	378	496	613	731	848			18
19	26.9	159	290	422	554	685	817	949			11
20	28.6	175	322	468	615	762	908	1055			3
21	30.5	193	355	517	680	842	1004	1166			12
22		211	390	569	748	926	1105	1284			6
23		231	427	623	819	1015	1211	1407	1603		9
24		252	466	679	893	1107	1321	1535	1749		6
25			506	738	971	1204	1436	1669	1902		5
26			548	800	1052	1304	1556	1808	2061		2
27			591	864	1136	1409	1681	1954	2226		4
28			637	930	1224	1517	1811	2104	2398		3
29			684	999	1314	1630	1945	2260	2576		1
30				1070	1408	1746	2084	2422	2760	3098	4
31				1144	1505	1867	2228	2589	2950	3311	1
32				1220	1606	1991	2376	2762	3147	3532	--
33				1299	1709	2119	2530	2940	3350	3760	--
34				1380	1816	2252	2688	3123	3559	3995	1
35				1464	1926	2388	2850	3312	3775	4237	--

^{1/} Table volumes obtained from weighted regression equation:

$$V_5 = -0.31628D^2 - 6.38318H_L + 0.38247D^2H_L + \frac{3388.25600}{D^2} \quad \text{Standard error of estimate around mean volume} = 36.19210 \text{ bd. ft.} = 6.92\%.$$

^{2/} Mid-point of class (e.g. 12 = 11.6 through 12.5 inches).

^{3/} Mid-point of class (e.g. 3 = 2.6 through 3.5 logs).

^{4/} Lines contain basic data for 217 measured trees used for computing regression equation. One tree not shown in the "Basis" column was in the 38-inch diameter class.

Table 16.--Scribner board-foot volumes (1-foot stump to merchantable ST top) for Sitka spruce, southeast Alaska^{1/}

D.b.h. D ₂ ^{2/}	Total height, H _T (feet) ^{3/}																Basis: trees meas- ured ^{4/}
	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	
Inches																	Number
11	18.4	35.7	53.0	70.2	87.5	105	122	139	157	174	191						25
12		47.5	68.0	88.6	109	130	150	171	191	212	232						16
13		60.7	84.8	109	133	157	181	205	230	254	278						23
14		75.4	103	131	159	187	215	243	271	299	327	355					16
15		91.5	124	156	188	220	252	284	316	348	380	412					19
16		109	146	182	219	255	292	328	365	401	438	474					17
17		128	169	210	252	293	334	375	417	458	499	540					14
18		148	194	241	287	333	380	426	472	518	564	611	657	703			18
19					325	376	428	479	531	582	634	685	737	788			11
20					365	422	479	536	593	650	707	764	821	878			3
21					407	470	533	596	658	721	784	847	910	973	1036		12
22					451	520	589	658	728	797	866	935	1004	1073	1142		6
23					498	574	649	724	800	876	951	1026	1102	1177	1253		9
24					547	629	712	794	876	958	1040	1122	1205	1287	1369		6
25					598	688	777	866	955	1044	1134	1223	1312	1401	1490		5
26							845	941	1038	1134	1231	1327	1424	1520	1617		2
26							916	1020	1124	1228	1332	1436	1540	1644	1748		4
28									1214	1326	1437	1549	1661	1773	1885		3
29									1307	1427	1547	1667	1787	1907	2027		1
30									1403	1532	1660	1788	1917	2045	2174	2302	4
31											1777	1914	2051	2189	2325	2463	1
32											1898	2044	2191	2337	2483	2629	--
33											2024	2179	2334	2490	2645	2801	--
34											2153	2318	2483	2648	2813	2978	1
35											2286	2461	2636	2811	2985	3160	--

^{1/} Table volumes obtained from weighted regression equation: $V_6 = -4.60417D + 0.01427D^2H_T$. Standard error of estimate around mean volume = 49.52736 bd.ft. = 10.51%.

^{2/} Mid-point of class (e.g. 12 = 11.6 through 12.5 inches).

^{3/} Mid-point of class (e.g. 80 = 76 through 85 feet).

^{4/} Lines contain basic data for 217 measured trees used for computing regression equation. One tree not shown in the "Basis" column was in the 38-inch diameter class.

Table 17.--Scribner board-foot volumes (1-foot stump to merchantable ST top) for Sitka spruce,
southeast Alaska ^{1/}

D.b.h. D ^{2/} Inches	Height, H _L (logs) ^{3/}										Basis: trees meas- ured ^{4/} Number
	1	2	3	4	5	6	7	8	9	10	
11	22.5	54.1	85.8	118	149	181	213				25
12	20.0	60.0	99.9	140	180	220	260				16
13	18.3	67.2	116	165	214	263	312				23
14	17.2	75.9	134	193	252	310	369	428			16
15	16.9	86.0	155	224	293	362	431	500			19
16	17.3	97.5	178	258	338	418	499	579			17
17	18.5	110	203	295	387	479	571	663			14
18	20.3	125	230	334	439	544	648	753			18
19	22.9	141	259	377	495	613	731	848			11
20	26.2	158	290	422	554	686	818	950			3
21	30.2	177	324	470	617	764	910	1057			12
22		197	359	521	684	846	1008	1170			6
23		219	397	575	754	932	1110	1289	1467		9
24		242	437	632	827	1023	1218	1413	1608		6
25			479	692	905	1118	1330	1543	1756		5
26			523	754	986	1217	1448	1679	1910		2
27			570	820	1070	1320	1570	1821	2071		4
28			618	888	1158	1428	1698	1968	2238		3
29			669	960	1250	1540	1831	2121	2412		1
30				1034	1345	1657	1968	2280	2592	2904	4
31				1110	1444	1778	2111	2445	2778	3112	1
32				1190	1547	1903	2259	2615	2971	3328	--
33				1273	1653	2032	2412	2791	3171	3550	--
34				1359	1762	2166	2570	2973	3377	3781	1
35				1447	1876	2304	2732	3161	3589	4018	--

^{1/} Table volumes obtained from weighted regression equation:

$V_7 = 108.78025 - 10.72841D - 11.79627H_L + 0.35939D^2H_L$. Standard error of estimate around mean volume = 34.63754 bd. ft. = 7.35%.

^{2/} Mid-point of class (e.g. 12 = 11.6 through 12.5 inches).

^{3/} Mid-point of class (e.g. 3 = 2.6 through 3.5 logs).

^{4/} Lines contain basic data for 217 measured trees used for computing regression equation. One tree not shown in the "Basis" column was in the 38-inch diameter class.